

CLAIM AMENDMENTS

IN THE CLAIMS

This listing of the claims will replace all prior versions, and listing, of claims in the application or previous response to office action:

Claims 1-11 (Canceled)

12. (Currently Amended) A direct injection internal combustion engine system[[,]] comprising:

a ~~at least one~~ cylinder having a piston moving along an axis;

a gas inlet and a gas outlet leading to an exhaust passage;

a ~~an~~ ~~Nox~~ ~~NO_x~~ reducing converter in said exhaust passage; and

intake and exhaust valves associated with said cylinder and said gas inlet and gas outlet, said valves arranged to provide internal exhaust-gas recirculation[[;]] ~~wherein~~ said cylinder, said gas inlet and said gas outlet ~~are~~ arranged to provide layered lean operation of said engine, ~~and~~ wherein said inlet passage is arranged to provide swirl in incoming gas having a swirl axis substantially transverse to said piston axis, and ~~wherein~~ in combination with a subsequent charging movement of the piston, causes an intermixture of residual exhaust gas with said incoming gas.

13. (Currently Amended) An engine system as specified in claim 12, wherein said inlet passage is arranged to provide a swirl that is a tumble movement.

14. (Currently Amended) An Internal combustion engine system according to Claim 13, wherein a tumble plate is provided in said gas inlet.

15. (Currently Amended) An Internal combustion engine system according to claim 12, wherein said engine is an Otto engine.

16. (Currently Amended) ~~An Internal-combustion-engine~~ system according to claim 12, wherein said passage is arranged for a layered charging.

17. (Currently Amended) ~~An Internal-combustion-engine~~ system according to claim 12, wherein there is further provided an arrangement for external exhaust-gas recirculation.

18. (Currently Amended) ~~An Internal-combustion-engine~~ system according to Claim 17, wherein the external exhaust-gas recirculation arrangement includes an arrangement for cooling recirculated gases.

19. (Currently Amended) ~~An Internal-combustion-engine~~ system according to Claim 17, wherein the external exhaust-gas recirculation arrangement includes a control valve.

20. (Currently Amended) ~~An Internal-combustion-engine~~ system according to claim 12, wherein the swirl has an axis which lies in the region of 75° to 105° of said piston axis.

21. (Currently Amended) ~~An Internal-combustion-engine~~ system according to claim 12, wherein said reducing converter comprises a NO_x storage catalyst.

22. (Currently Amended) ~~An Internal-combustion-engine~~ system according to claim 21, wherein said storage catalyst is controlled by a NO_x sensor.

23. (Currently Amended) ~~An Internal-combustion-engine~~ system according to claim 12, further comprising wherein there is provided an arrangement for controlling internal exhaust-gas recirculation by adjustment of intake valve opening times in the direction of early.

24. (Currently Amended) A direct injection internal combustion engine system[[,]] comprising:

~~a at least one~~ cylinder having a piston moving along an axis;

a gas inlet and a gas outlet leading to an exhaust passage;
a preliminary ~~NO_x~~-NO_x catalyst in said exhaust passage followed downstream by ~~a an~~ ~~NO_x~~-NO_x storage catalyst;
an external exhaust-gas recirculation line comprising an exhaust-gas cooler and a control valve wherein said exhaust-gas recirculation line couples said gas outlet with said gas inlet;
a lambda probe arranged between said gas outlet and said preliminary ~~NO_x~~-NO_x catalyst;
a temperature sensor arranged between said preliminary ~~NO_x~~-NO_x catalyst and said ~~NO_x~~-NO_x storage catalyst;
a ~~NO_x~~-NO_x sensor arranged downstream of said ~~NO_x~~-NO_x storage catalyst; and
intake and exhaust valves associated with said cylinder and said gas inlet and gas outlet, arranged to provide internal exhaust-gas recirculation,~~;~~ ~~wherein~~ said cylinder, said gas inlet and said gas outlet ~~are~~ arranged to provide layered lean operation of said engine,~~;~~ ~~wherein~~ said inlet passage is arranged to provide swirl in incoming gas having a swirl axis substantially transverse to said piston axis, ~~and wherein~~ in combination with a subsequent charging movement of the piston, ~~causes~~ an intermixture of residual exhaust gas with said incoming gas; and ~~wherein the system further comprises~~
a control unit receiving signals from said sensors and said probe for controlling said direct injection and said intermixture.

25. (Currently Amended) A direct injection internal combustion engine system[[,]] comprising:

~~a at least one~~ cylinder having a piston moving along an axis;
a gas inlet channel and a gas outlet leading to an exhaust passage;
~~a an~~ ~~NO_x~~-NO_x reducing converter in said exhaust passage; and
intake and exhaust valves associated with said cylinder and said gas inlet channel and gas outlet, arranged to provide internal exhaust-gas recirculation,~~;~~ ~~wherein~~ said cylinder, said gas inlet channel and said gas outlet are arranged to provide layered lean operation of said engine,~~;~~ ~~and wherein~~ said inlet channel comprises a controllable tumble plate which can

be laid against a wall of said inlet channel to allow incoming gas to pass by or can be set to provide swirl in incoming gas, ~~having a wherein the axis of said~~ swirl ~~axis is~~ substantially transverse to said piston axis and arranged to cause an intermixture of residual exhaust gas with said incoming gas.

26. (Currently Amended) A direct injection internal combustion engine system[[,]] comprising:

- ~~a at least one~~ cylinder having a piston moving along an axis;
- a gas inlet channel and a gas outlet leading to an exhaust passage;
- a preliminary ~~Nox-NO_x~~ catalyst in said exhaust passage followed downstream by a ~~an~~ ~~Nox-NO_x~~ storage catalyst;
- an external exhaust-gas recirculation line comprising an exhaust-gas cooler and a control valve wherein said exhaust-gas recirculation line couples said gas outlet with said gas inlet channel;
- a lambda probe arranged between said gas outlet and said preliminary ~~Nox-NO_x~~ catalyst;
- a temperature sensor arranged between said preliminary ~~Nox-NO_x~~ catalyst and said ~~Nox-NO_x~~ storage catalyst;
- a ~~Nox-NO_x~~ sensor arranged downstream of said ~~Nox-NO_x~~ storage catalyst; and
- intake and exhaust valves associated with said cylinder and said gas inlet channel and gas outlet, arranged to provide internal exhaust-gas recirculation, ~~;- wherein~~ said cylinder, said gas inlet channel and said gas outlet are arranged to provide layered lean operation of said engine, ~~;- wherein~~ said inlet channel comprises a controllable tumble plate which can be laid against a wall of said inlet channel to allow incoming gas to pass by or can be set to provide swirl in incoming gas, ~~having a wherein said~~ swirl has an axis substantially transverse to said piston axis and arranged to cause an intermixture of residual exhaust gas with said incoming gas; and ~~wherein the system further comprises,~~
- a control unit receiving signals from said sensors and said probe for controlling said direct injection and said intermixture.